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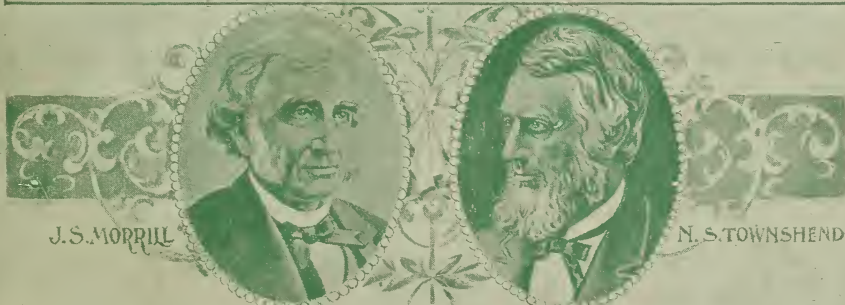
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Vol. VIII.

NOVEMBER, 1901.

No. 3.

THE AGRICULTURAL STUDENT



A MONTHLY MAGAZINE DEVOTED TO
AGRICULTURAL EDUCATION.

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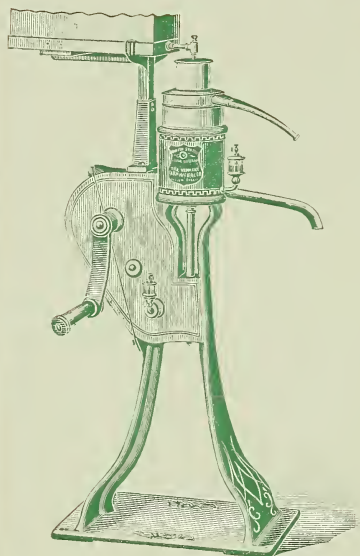
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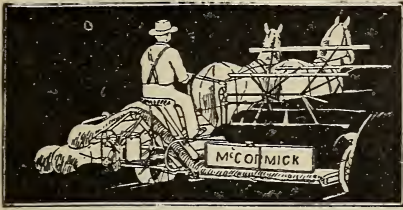
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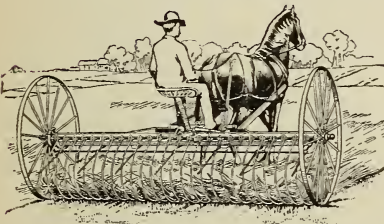
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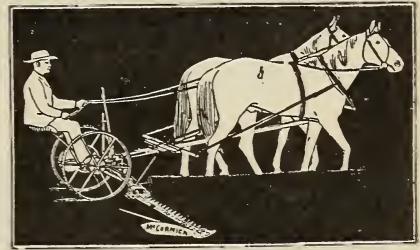
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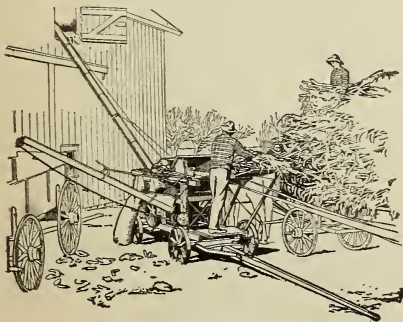
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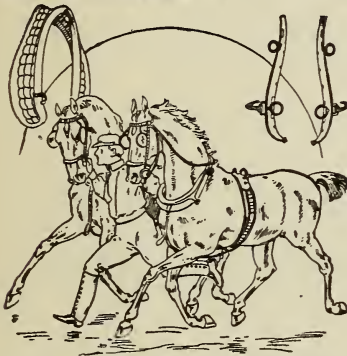
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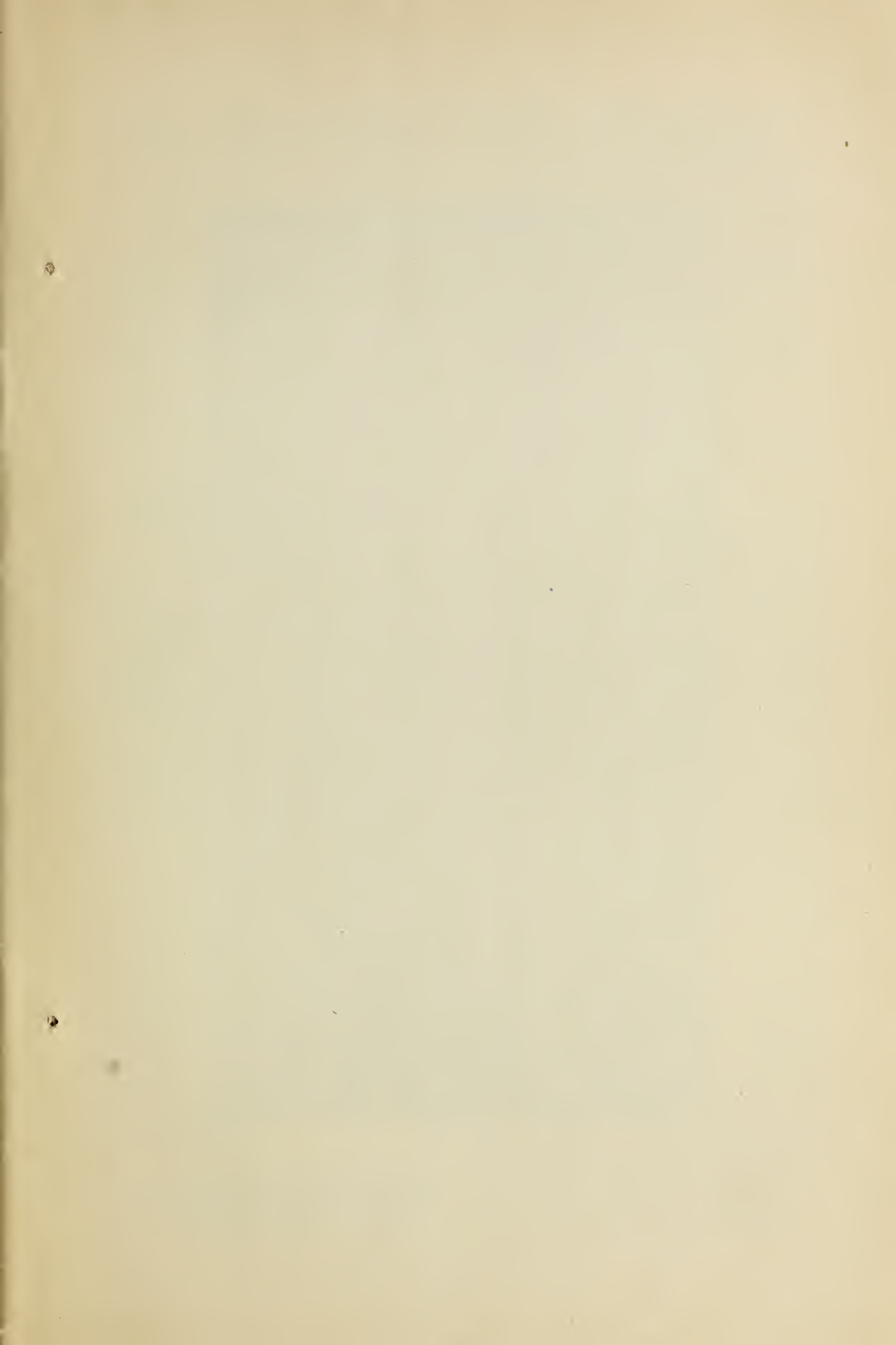
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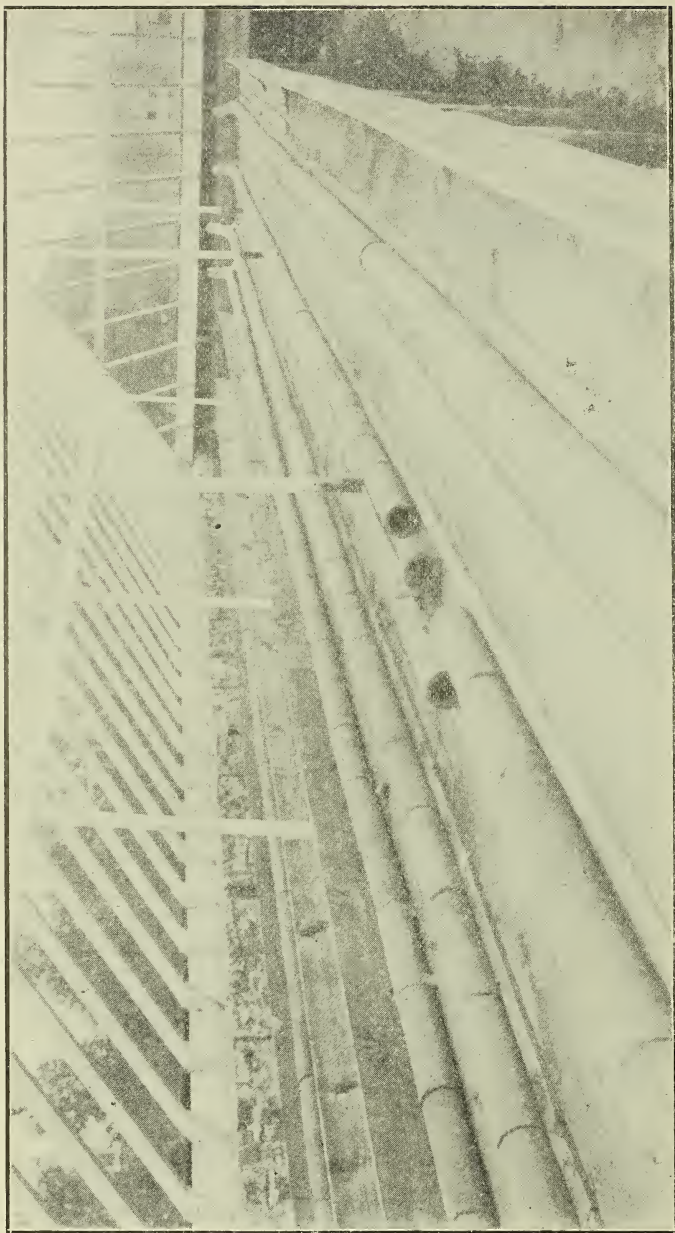
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(See Page 50.)

THE AGRICULTURAL STUDENT.

VOL. VIII.

OHIO STATE UNIVERSITY, COLUMBUS, NOVEMBER, 1901.

No. 3.

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EDITORIAL CHAT.

Country Life in America is the title of a new magazine to be published by the World's Work Publishing Co., and edited by Prof. L. H. Bailey. The first number will appear in November and every month thereafter. The magazine will be devoted to gardening, horticulture, nature study, and everything out of doors. The object may perhaps be best stated in the announcement of the editor: "Only when we love the country is country life worth living. Satisfaction and contentment of soul are beyond all question of pecuniary reward. We will clasp hands with every person who loves the country; we will engender that love in persons who love it not; and thus we would come into sympathy with all mankind."

A scientific investigation of various problems connected with the gorgeous colorings of autumn has been undertaken by the new Bureau of Plant Industry. A Study of Autumn Leaves is the title of a bulletin of that department by Albert F. Woods. He says in substance: The color of leaves is furnished by means of minute grains of pigment within their cells. What we see in the fresh leaf is not a simple green, but a combination of



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many pigments which when mixed appear as a solid green.

In regard to the coloring, Mr. Woods says all the colors exist in the leaf, and that any color at a given time is simply due to the preponderance of that color pigment, the others having been removed or obscured by the natural process taking place in the leaf. Therefore, a preponderance of red, yellow or green is due to the destruction of all other colors. Some botanists have attributed this to frosts, and we are finding that light frosts hasten the coloring by causing an increase of the normal chemical ferments.

Autumn leaves containing sugar, as those of maples, sumacs, gums, etc., easily oxidize, thus forming the rich reds, purples and violets so beautiful to the eye. That is why these, especially the hard maples, give such beautiful colors. Oaks contain much tannin and usually have a dirty brown color. Leaves which die quickly never give brilliant colors. Gorgeous colors are produced by a long drawn out fall whose days gradually cool from summer heat to winter snow. If frost comes early and the weather is uneven we need not expect the true autumnal splendors.

Proposed New Buildings.

The President and the Board of Trustees have come to the conclusion that the institution must be enlarged in several ways to maintain its well-earned place among the progressive colleges of the land. The Trustees will meet November 6, to discuss the situation and formulate plans for bringing the needs of the rapidly growing institution before the next General Assembly. Three new buildings are an urgent necessity, but perhaps the most urgent of all is a suitable building to be used exclusively for engineers. There are six departments of

engineering and the facilities for caring for the students in these branches are meager indeed. The other buildings for which there is an urgent need are a Woman's building to be devoted to the teaching of Domestic Science, and at the same time furnish a home for the young women of the University; a building for Library purposes, and an Administration building. The rapidly growing Veterinary College is also in urgent need of a suitable home.

It is probable that should the legislature consent to an appropriation for only one building the Trustees will recommend its use in the construction of an Engineering building.

Cattle Sale.

About twenty-five of the students in agriculture attended the sale of Short Horn and Polled Durham cattle by Mr. Arthur H. Jones at Delaware, O., Tuesday, October 15. Seventy head of the choicest of the Fairholme herd was sold, the grand total of the sales amounting to over \$10,000.

Those students especially interested in stock visited the stables and looked the cattle over with Professor Hunt and Mr. Ruhlen, before the sale. While those interested in horticulture visited the large apple orchard of Mr. Vergeron, just north of the city, accompanied by Professor Lazenby and Mr. Davis.

Student Judges.

The demand for expert judges in all classes of exhibits at the county fairs is constantly increasing. The managers are also finding out that the graduates from the agricultural colleges are admirably fitted for the work, and almost without exception give perfect satisfaction. The greater part of these students have been surrounded by live stock all

their lives, and have a thorough practical, as well as scientific knowledge of what they are asked to pass judgment upon.

Mr. Frank Ruhlen, Assistant in Agriculture, judged cattle and hogs at the Delaware County Fair; cattle and farm products at the Montgomery County Fair, and cattle, sheep and hogs at the Fairfield County Fair. Mr. E. L. Shaw judged sheep at the Delaware County Fair. R. W. Dunlap judged horses, cattle and hogs at the Logan County Fair.

Agriculture at the World's Fair, St. Louis, 1903.

Interest in the Agricultural Department of the World's Fair at St. Louis, in 1903, is spreading rapidly to all parts of the World.

The World's Fair held within the Louisiana Purchase territory will set the trans-Mississippi country before the rest of the world in a new light. There is no longer a "Great American Desert" in the geographies, but there is a faint realization of what has taken the place of that desert. The last United States census reports show that the fourteen states and territories carved out of this country that Napoleon sold to Thomas Jefferson for \$15,000,000, has now a taxable wealth of \$6,616,642,829. The figures are almost beyond comprehension.

In the Louisiana Purchase territory there are now under cultivation 165,878,336 acres. The value of these is \$3,193,461,200. This means an average valuation for this mighty domain in cultivation of \$20 an acre. The farm products including the live stock within the limit of this territory, make a total of \$1,876,184,431.

The Agricultural Committee of the Louisiana Purchase Exposition Company went early to work to inform the various interests over which that de-

partment has control, including besides agriculture proper, the Departments of Horticulture, Floriculture, Forestry, Dairy, Live Stock and Farm Machinery and Implements, that they intended to make the Agricultural Department at the St. Louis World's Fair a record breaker when compared with everything that had heretofore been attempted in that line.

Suggestions from the brightest minds among the skilled agriculturalists, horticulturalists, dairymen and stock breeders as to what is best to do to succeed are plentiful, and out of them, or rather upon them as a foundation, the committee will rear the Agricultural exhibit superstructure of the World's Fair, that is to dazzle the eyes of the whole world.

It has been suggested that an important and highly interesting display in the line of grapes could be made by planting some three or four hundred varieties of native grapes in the spring of 1902, in well prepared soil in the open air, and have them in full fruit during the exposition. The same method could be followed with the European grapes in suitable conservatories.

A pomological exhibit from around the world, would be exceedingly attractive and instructive, and would be one of the most notable events of the fair.

Bearing trees of various tropical and sub-tropical fruits, together with large and fruiting palms, could be assembled in a large palm house, making possible a wealth of beauty, never previously shown. While the exhibit of perishable products could not perhaps be world-wide, there is ample opportunity to surpass anything that has ever been done in that line.

And then the live stock department. "The Committee on Agriculture," says Secretary Aull, "is determined at any cost to make the live stock exhibit the most complete and comprehensive dis-

play of domestic animals the world has ever seen. The premium lists will show more money to be paid in premiums than was ever before offered for live stock exhibits, and what is more important still, no domestic animal will be omitted from the list. The accommodations for stockmen and their animals will be spacious and the judges who will award the premiums in this department will be men of undisputed integrity and ability.

The dairy cow and the products of the dairy will be worth seeing, for the dairy department is to be something more elaborate than has heretofore been attempted in this line. In the Agricultural Department every promise will be fulfilled. The World's Fair at St. Louis will bring people from all parts of the United States and from every quarter of the globe, and will show them, as they could be shown, in no other way the magnificent territory which Napoleon transferred. The millions who will visit the exposition and will see gathered there the exhibits from all parts of the purchase, will travel north, west and south over every part of the Louisiana purchase, visiting the grain fields, the cattle ranges, the mining regions. Then they will learn something.

Even to the people of the purchase, the World's Fair will be a revelation. How many inhabitants of the Louisiana territory appreciate the fact that within its limits grows one-half of the cotton raised in the United States? A billion bushels of corn is no longer an extraordinary crop for the belt that lies within these states and territories. The wheat which goes to all parts of the world from another belt stretching from Northern Texas to the British line, ranges in value between \$100,000,000 and \$200,000,000. On the meadows of the Louisiana purchase is gathered a hay crop which reaches \$150,000,000. The horses and mules and cattle upon the ranges are valued at \$1,000,000,000.

Agriculture, by which the great Louisiana purchase was developed, will receive the highest compliment which the World's Fair at St. Louis can bestow. To this greatest of industries the greatest of all buildings ever constructed for any purpose will be dedicated. The Agricultural Building for the Louisiana Purchase Exposition, will be 2,000 feet long and 700 feet wide, containing an area of 1,400,000 square feet, or about 32 acres. Any person can best realize what these dimensions mean by finding a field of 32 acres and walking around or across it. It will contain about 100,000,000 cubic feet of space, and the area of the floor space is sufficient for 4,666 exhibitors allowing to each a space of 10x20 feet and a space of 10x10 to the center of the aisle, or 300 square feet in all.

The division of Agriculture will be the most complete and comprehensive ever presented, treating broadly of the science and principles of agriculture, farms, buildings, tools and machinery, the culture of cereals, grasses and forage plants, the culture of tobacco and textile plants, the vine and its products, economic horticulture, having special reference to vegetables and fruits, recreative horticulture, including landscape gardening, floriculture and window gardening, domesticated animals, stock raising, the dairy industry, wool growing and the minor animal industries.

Besides the great building devoted to agriculture, there will be the vast area of live stock buildings, the outdoor horticulture exhibits and other extensive special displays housed in special buildings, or having a special location out of doors.

Prof. John A. Craig, who recently retired from the Chair of Animal Industry at the Iowa State College, did so in order to accept the managing editorship of the Iowa Homestead at a greatly increased salary.

Agricultural College News.

F. H. King, since 1888 Professor of Agricultural Physics in the University of Wisconsin, has accepted a position as chief of a new division created in the Bureau of Soils, and goes to the new appointment in November next. The vacancy has not yet been filled.

Dr. E. M. Wilcox, M. Sc. (Ohio State), and Ph. D. (Harvard), Professor in the Agricultural and Mechanical College of Oklahoma, has been appointed Professor of Biology in the Alabama Polytechnic Institute.

Mr. C. K. McClelland of the class of '99, is taking post-graduate work in agriculture at Cornell University.

Mr. N. P. Neill, of the class of '00, has been appointed Field Assistant in the Division of Soils, United States Department of Agriculture. Mr. Neill is the seventh graduate of the Agricultural College at O. S. U. to enter the work of the department within the last year.

Mr. J. R. Fain, a graduate of the University of Tennessee, '00, is taking graduate work in soils under Professor Gibbs. He will return to his alma mater next year, where he has the position of Instructor in Soils.

W. D. Gibbs, Professor Agronomy in the Agricultural College, has accepted the position of Professor of Agriculture in the College of Agriculture and Mechanical Arts at Durham, New Hampshire. In addition to this, Professor Gibbs will be Director of the Experiment Station. While we congratulate New Hampshire upon securing the services of such a thoroughly competent man for this important position, it makes a vacancy in the faculty of the Ohio College of Agriculture that cannot be easily filled. Professor Gibbs will probably assume the duties of his new position about the first of January.

Professor Hunt and five of the students in Animal Industry, attended the Fairfield County Fair, October 12. From the time the party stepped from the train until they left for Columbus, they were the guests of the Fair management, and nothing was left undone that could add pleasure or profit to their trip. The students of the party scored several breeds of cattle for practice. They were Messrs. E. L. Shaw, F. E. Hamilton, T. W. Ditto, O. A. Pettiford, J. A. Folsom, who will represent the Ohio State University in the Student Judging Contest, at the National Live Stock show, to be held at Chicago in December.

Townshend Literary Society gave a reception to the new students Friday evening, October 12. About a hundred people were present and nothing but praise was heard for the manner in which the Townshend boys entertain. Each one was presented with a very pretty program, to be used in dancing or in other forms of amusement, as they desired. The leaves of many of our most common trees were mounted and prizes offered for the one naming the most leaves correctly.

The merriment was ended by the lights going out, but everyone went home feeling better acquainted with his fellow students than ever before. Several of the professors were present, and the guest of honor was Dr. A. C. True of the Department of Agriculture, Washington, D. C.

Mr. C. C. Poindexter, a student in the Agricultural Department, is canvassing for "The Story of My Life and Work," by Booker T. Washington. It is needless for us to say anything of the book and its author, or of his wonderful work for the freedmen of this country. Mr. Washington has done more to solve the race question than any other one man,

and every thinking American citizen, whether white or black, should become thoroughly acquainted with the man and his works.

Mr. Poindexter is a colored student and among the brightest in the Agricultural course. He has the distinction of personal acquaintance with the man of his race, who today, stands head and shoulders above all the rest. Should he call upon any of our readers, we trust that they will secure a book, and thereby not only aid Mr. Poindexter in obtaining an education, but also become better informed, upon one of the most serious problems of the times.

"The rural industries have taken on a new and quickened life in consequence of the recent teachings and applications of science. Agriculture is no longer a mere empiricism, not a congeries of detached experience, but it rests upon an irrevocable foundation of laws."—Prof. L. H. Bailey.

Arlington Club's Annual Horse Show.

Professor Hunt and his classes in agriculture attended the annual horse show of the Arlington Club, October 3d, at the club's athletic grounds. The show was a success both in point of attendance and entries, there being eleven events in all. As usual the social side of the show was an important feature. Many of the city's most fashionable turnouts were in evidence.

The Graduate Summer School of Agriculture.

Plans are rapidly maturing for the establishment of the above school, and there is little doubt but that the first session will be held in connection with the Ohio State University in the summer of 1902. A short history of the

movement will be of interest to our readers.

The first official action with regard to this enterprise was taken by the Board of Trustees of the Ohio State University on June 12, 1900, as shown by the minutes of that meeting.

A communication from Prof. Hunt was presented, suggesting the appointment of a committee to consider the advisability of establishing a summer school for higher instruction in agriculture, to be established by the University itself, or in connection with a number of land grant colleges. The communication and the recommendations therein contained were approved and the matter referred to the farm committee for consideration. Later the Board of Trustees adopted the following report of the farm committee:

First. That there be established at the Ohio State University a Summer School for Post-graduate Students in Agriculture, in which the leading professors of Agricultural Science in the United States and Canada shall be invited to conduct courses of study of a character suited to the needs of teachers, investigators, and post-graduate students.

Second. That the first session begin on the first Monday in August, 1902, and continue four weeks.

Third. That the Faculty be authorized to prepare a program of exercises.

Fourth. That the President be authorized to nominate to the Board of Trustees suitable persons to carry out said program, provided the total expenses of the first session shall not exceed one thousand dollars.

At the meeting of the American Association of Agricultural Colleges and Experiment Stations, November, 1900, President Thompson presented an outline of the plan for the proposed school. The Association referred it to the Exec-

utive Committee with instructions to report at the next meeting. At the annual session of the Association for 1901 the plans as outlined by President Thompson were accepted and further recommended that, if the success of the initial session should justify the continuation of the Summer School, it be assumed as a co-operative enterprise under the control of the Association.

The general plan of the Graduate Summer School of Agriculture having received the approval of the Executive Committee of the A. A. A. C. and E. S., the Ohio State University has undertaken to start the enterprise by the selection of a Dean or Director. The tender of this position has been made to Dr. A. C. True, Director of the Office of Experiment Stations, United States Department of Agriculture, Washington, D. C. Hon. James Wilson, Secretary of Agriculture, has expressed his most cordial approval and sympathy with the enterprise, and in all probability Dr. True will accept the position of Dean of the new college, provided the leading educators of the United States and Canada can be secured to give the courses of lectures or conduct laboratory demonstration work in the lines of work which have been outlined.

Letters have been sent to a score or more men whose names would give the school prestige all over the country, and, as the matter stands at present, the completion of the enterprise will depend upon the encouragement it gets from those invited to give instruction. It seems safe to predict, however, that the Graduate Summer School in Agriculture is an assured thing.

A Comparison of the Cut-Away-Disc Harrow and the Spring-Tooth Harrow.

The wide use to which the disc-harrow and the spring-tooth harrow have been put has made a practical compari-

son of these implements a matter of much interest.

A few weeks ago, a class of students made a test of these two implements, placing them side by side and making observations of their efficiency and draft when set at various depths.

The soil selected for the test was fallow ground which during the past season had been plowed twice and rolled with a hollow-tube roller. The plat had recently been sowed to turnips and was practically bare.

The cutaway-disc was tried first, with the discs set almost straight, the lever being at the third notch. The discs cut about $11\frac{1}{2}$ inches deep and 8 feet wide, and disturbed about one-third of the total surface. For the next trial the levers were set at the fifth notch and nearly all of the surface was loosened 3 inches deep and 94 inches wide. The surface was left in good condition, but the soil was not very well loosened beneath the surface. It was then set to the seventh or last notch. Here it cut 90 inches wide and 5 inches deep and left the soil in an excellent condition, underneath as well as upon the surface. Then it was weighted down by having two men, each weighing 165 pounds, stand upon it, one on each side, but no difference could be seen in the quality of the work.

The spring-tooth harrow was then tried with the lever set at the seventh notch. Most of the soil was stirred 6 feet wide and $11\frac{1}{2}$ inches deep, and the surface was left only fairly smooth. When set at the ninth notch, all of the soil was stirred 3 inches deep and was left slightly cloddy and rough. Set at the eleventh notch, all of the soil was stirred 5 inches deep, but the surface was left in ridges of about $1\frac{1}{2}$ inches.

Taken at corresponding depths, it was generally conceded that the spring-tooth harrow tore up the soil more thor-

oughly, but did not leave it in as good condition as the cutaway.

When the dynamometer, the draft-registering instrument, was examined, came the greatest surprise. The following table speaks for itself:

	Total Draft.	—Soil Stirred— Width.	Draft per foot Depth. of width of soil stirred.	
Spring-Tooth—				
7th Notch 300 lbs.		72 in.	1½ in.	50 lbs.
9th Notch 500 lbs.		72 in.	3 in.	83.3 lbs.
11th Notch 700 lbs.		72 in.	5 in.	116.6 lbs.
Cutaway-Disc—				
3rd Notch 175 lbs.		96 in.	1½ in.	22 lbs.
5th Notch 300 lbs.		94 in.	2½ in.	38.3 lbs.
7th Notch 500 lbs.		90 in.	5 in.	66.6 lbs.
Weighted 775 lbs.		90 in.	5 in.	103.3 lbs.

Since the third trial with each gave the only satisfactory results as to efficiency of work done, we may take them as a comparison. Both loosened the soil at the same depth, but the cutaway had the advantage in draft in the ratio of 7 to 4. Since the cutaway left the soil in better condition, we may well be justified in claiming it to be twice as good an implement as the spring-tooth.

The main fault to be found with the disc used was that it left a strip about four inches wide in the center, but some machines are made to avoid this.

The spring-tooth harrow would work well, only in clean ground, for the teeth would continually be gathering trash, thus causing much annoyance to the operator and a great loss of time.

All things being taken into consideration, I would not hesitate to recommend the disc harrow as being vastly superior to the spring-tooth for any ordinary purposes.

C. A. McCLELLAND.

Sub-Irrigation in the Greenhouse.

PROFESSOR WILLIAM R. LAZENBY.

More than ten years have elapsed since the first experiments in greenhouse irrigation were made.

The idea was first conceived and developed by the Ohio Experiment Station in the greenhouses of the Ohio

State University, and has been practiced in the greenhouses of the university continually since then.

Ten years of careful observation and study of this method of watering should enable one to speak with some degree of confidence.

We are firmly convinced that the practice of sub-irrigation marks a decided step in advance in greenhouse management. While it will not wholly take the place of surface watering, we confidently predict that as its merits become better known, it will more and more be used.

Not to mention improved growth, and the prevention of fungus diseases, the particular merits of sub-irrigation that appeal to the commercial grower, are a saving of labor, and a saving of water. These advantages are unquestioned and in the vegetable forcing house especially, are items of no little importance.

It is probable that the effects of sub-irrigation upon greenhouse crops as far as the mere application of water is concerned, have often been overrated. The more perfect creation, and the higher temperature of the soil, caused by the irrigating tiles have undoubtedly had a marked effect upon the growth and development of certain crops. Admitting that some benefit arises from the tiles alone, still this after all, must be credited to the system, for the tiles are placed under the soil primarily for under surface watering or sub-irrigation.

Sub-irrigation in the greenhouse has come to stay, but it has come by methods that are susceptible of improvement. While the general merits of the system are well understood, its application to different classes of greenhouse structures is somewhat slow.

For myself, I am free to say that nothing I have ever done in connection with the vegetable forcing house, has been so

entirely satisfactory as this system of watering.

The frontispiece shows the method of laying the tiles in the beds or benches of the greenhouse.

Startling Facts About Sugar.

As a good deal has recently appeared in print regarding the consumption of sugar, and as the importance of this article as a food, in which every individual is concerned, is apparently not sufficiently understood, the following facts and figures furnished to us by the well-known sugar statisticians, Messrs. Willett and Gray (91 Wall street, New York), who are the publishers of the weekly Statistical Sugar Trade Journal, must necessarily be of great interest to all our readers:

RAW SUGAR.		Tons.
Total consumption, U. S., 1900 (Willett and Gray).....		2,219,847
Add 6.34 per cent., average annual increase in consumption last 19 years.....		140,738
Consumption for 1901.....		2,360,585
Of which	Tons.	
Louisiana produces.....	350,000	
Beet (domestic) produces	150,000	
Hawaii (free) produces	350,000	
Porto Rico (free) produces	150,000	1,000,000
		1,360,585
Paying duty at an average of say \$36 per ton.....		\$48,981,060
(Equivalent to \$40 per ton in Granulated.)		
(Price increased because of tariff, \$36 per ton.)		
Total consumption, 2,360,585 tons @ \$36		\$84,981,060
Additional, people taxed annually and pay to provide 49 millions for revenue.....		\$36,000,000
Viz.:		
To Louisiana planters on 350,000 tons at \$36 per ton		\$12,600,000
To domestic beet planters on 150,000 tons at \$36 per ton		5,400,000
To Hawaii planters on 350,000 tons at \$36 per ton		12,600,000
To Porto Rico planters on 150,000 tons at \$36 per ton		5,400,000
		\$36,000,000

Remove duty and the whole \$84,981,060 accrue to the public. On October 8, the quotation for Cuba centrifugal sugar, 96 per cent. test, free on board

Cuba, was 1.96 cents per pound, and the duty on same amounted to 1.685 cents per pound, which is equivalent to 86 per cent. ad valorem.

Indiana's New Agricultural Building

Purdue University is one of several state institutions that have, within the past few years, received recognition for their work in agriculture by having appropriations made by the state legislature for new buildings and further equipment. The Department of Agriculture of Purdue will within the coming year be housed in a new building, a cut of which appears in these columns

The new building will be two stories in height, with a high basement, making three stories for the instruction work. In the basement will be found the dairy laboratory, the laboratory for soil physics, farm machinery room, and laboratory for horticulture. Each of the laboratories will be equipped with the most modern apparatus and every facility will be offered the student for thorough investigation.

On the first floor will be located the offices and class rooms of the Departments of Agriculture and Horticulture, with laboratories. The Department of Veterinary Science will have class rooms and offices on the second floor. The second floor will also have a hall for the use of Purdue Grange. In addition to this there is an assembly room provided for the students of the School of Agriculture, where they may be called together for special lectures and where the meetings of the technical society in Agriculture may be held.

The addition of this modern and well-equipped structure to Purdue's equipment is not only an illustration of the progress of agricultural education, but it is a very gratifying evidence of the high esteem in which the School of Ag-

riculture and the University as a whole is held by the citizens of the State of Indiana. The people of that state are beginning to realize as never before that the young man who wishes to follow agriculture as an occupation must have equal opportunity with the young men who are to engage in other gainful occupations. In order that these advantages may be secured to him the state is

are sincere, but with others it is merely the idle talk of idle people. Country life offers many charms to city people and they are ever ready to spend a day or so with friends in the country and enjoy the life which the farmer is permitted to live always. On the other hand, shiftless and discontented farmers are continually crying against their hard life, and at the first opportunity will move to the city



INDIANA'S NEW AGRICULTURAL BUILDING.

turning its attention to the erection and equipment of a building and the providing of equipment commensurate with the importance of the work to be done. Purdue is essentially an industrial university in its aims and attainments. The "liberal and practical education of the industrial classes" is kept constantly in mind.

Intellectual and Moral Advantages of Country Life.

Poets have sung the praises of the happy lot of the farmer for thousands of years and have caused millions of people in every calling of life to look enviously upon the tiller of the soil. How often today we hear busy people of the city, speaking those same thoughts, and yet we place no confidence in the veracity of their talk, simply because we hear it so often, and because we are inclined to believe that it is a pleasing way they have of offering sympathy clothed in the brightest hues of envy. To be sure, many

where they think life is so much easier. It is no uncommon thing to hear of farmers moving their families to town in order that their children may have more social and educational advantages. This is because of the actual condition of affairs as they really exist in the majority of communities, but not as they should be. Some will say, of course, the conditions are not as they should be, but how shall they be bettered? It is not within my power to answer, but suffice it to say that with the increase of population in the country the time will come when country schools will not be inferior to the city schools. At the present we will have to admit that the city has an advantage, but we will not admit that it has every advantage. In some states the question of nature studies in public schools is being vigorously agitated and in some it is an established fact; and it is really surprising how little the majority of city children know of the simplest facts in regard to plant and animal life. The country child is far less ignorant on

such subjects because he is already somewhat familiar with them. Modern school education is not gained wholly from books or the teacher as it once was, but today the teacher and the books serve as guides and the student is compelled to work out his own salvation through observation and experiments. A fact is more deeply impressed upon the mind when brought about through one's own exertion than in any other way. Here, then, we come to the one great advantage which the country has over the city; and that is in the study of nature. Is there anywhere to be found a teacher greater than nature herself? God in his infinite wisdom made nature, while man in his power and skill makes cities. Great admiration is expressed over the beauties of both, and we often wonder at the work of man, but let us go far from the gay cities and the ways of men and pass through the Mammoth Cave or the Garden of the Gods; does our emotion cease with wonder? Can the city produce a greater teacher of the geological past than the deep canons and high mountains of the West? Did Bessey, Gray or Linnaeus have greater teachers than flowers themselves? The story of Sir Isaac Newton and the apple is known to all. Was there ever a more interesting and wonderful lesson taught in the city schoolroom than the growth of plants as found in our own fields, how the lifeless elements of the soil are transformed into a plant with life? Did a college professor ever tell you of as many injurious insects as you can find for yourself on your own farm?

"Who can paint like nature?

Can imagination boast

Amid its gay creation, hues like hers?
Or can it mix them with that matchless
skill,

And lose them in each other, as ap-
pears

In every bud that blows?"

In the spring of the year when all nature bursts forth in triumphant harmony there is no one so happy as the farmer, for he is surrounded on every side by the beautiful, and every living thing is a joy. There is nothing that will afford more pleasure, inspire more beautiful thoughts or teach greater lessons than a stroll through the woods on an early summer morn when the trees are clothed in their beautiful green robes and the air redolent of those sweets which is so enticing to every school boy. Does the city offer to either young or old a greater balm or stimulus or long life than the teachings of nature in this schoolroom? Under such circumstances is it a wonder that country folks are the most social, most moral, and most susceptible to education of any other class of people? Biographers have credited the country with the greatest minds of the ages. The country school essayist never fails to mention the names of our brightest statesmen and most loved presidents who have gone from the farm to such high stations in life, and in every one we see the peculiarities of their early training bearing the marks of nature's own stamp. It is the life of freedom that is more productive of good, and when one is in close touch with nature, his whole being is buoyant and it is then that work becomes interesting and inspires one to further and deeper study, which leads to knowledge and from knowledge to wisdom and happiness, the great aim of life. With the spirit of the poets I would say:

"Mine be a cot beside the hill;

A beehive's hum shall soothe my ear;

A willow brook that turns a mill

With many a fall, shall linger near."

Ernest J. Riggs.

Gallia, Co., Ohio.

Dr. Koch on Bovine Tuberculosis.

"Great importance used to be attached to the hereditary transmission of tuberculosis. Now, however, it has been demonstrated by thorough investigation that, though hereditary tuberculosis is not absolutely non-existent, it is nevertheless extremely rare, and we are at liberty, in considering our practical measures, to leave this form of origination entirely out of account.

"But another possibility of tuberculosis infection exists, as is generally assumed, in the transmission of the germs of the disease from tuberculous animals to man. This manner of infection is generally regarded nowadays as proved, and as so frequent that it is even looked upon by not a few as the most important, and the most rigorous measures are demanded against it. Now, my investigations have led me to form an opinion deviating from that which is generally accepted.

"Genuine tuberculosis has hitherto been observed in almost all domestic animals, and most frequently in poultry and cattle. The tuberculosis of poultry, however, differs so much from human tuberculosis that we may leave it out of account as a possible source of infection for man. So, strictly speaking, the only kind of tuberculosis remaining to be considered is the tuberculosis of cattle, which, if really transferable to man, would indeed have frequent opportunities of infecting human beings through the drinking of the milk and the eating of the flesh of diseased animals.

"It is well known that the milk and butter consumed in great cities very often contain large quantities of bacilli of bovine tuberculosis in a living condition, as the numerous infection experiments with such dairy products on animals have proved. Most of the inhabitants of such cities daily consume such bovine tuber-

culosis and unintentionally carry out the experiment which we are not at liberty to make. If the bacilli of bovine tuberculosis were able to infect human beings many cases of tuberculosis caused by the consumption of alimenta containing tubercle bacilli could not but occur among the inhabitants of great cities, especially the children. And most medical men believe that this is actually the cases.

"In reality, however, this is not so. That a case of tuberculosis has been caused by alimenta can be assumed with certainty only when the intestine suffers first—that is, when a so-called primary tuberculosis of the intestine is found. But such cases are extremely rare. Among many cases of tuberculosis examined after death, I myself remember having seen primary tuberculosis of the intestine only twice. Among the great post mortem material of the Charity Hospital in Berlin ten cases of primary tuberculosis of the intestine occurred in five years. Among 933 cases of tuberculosis in children at the Emperor Frederick's Hospital for Children, Baginsky never found tuberculosis of the intestine without simultaneous disease of the lungs and the bronchial glands. Among 3,104 post mortem examinations of tuberculous children, Biedert observed only sixteen cases of primary tuberculosis of the intestine. I could cite from the literature of the subject many more statistics of the same kind, all indubitably showing that primary tuberculosis of the intestine, especially among children, is a comparatively rare disease, and of these few cases that have been enumerated it is by no means certain that they were due to infection by bovine tuberculosis. It is just as likely that they were caused by the widely propagated bacilli of human tuberculosis, which may have got into the digestive canal in some way or other. Hitherto nobody could decide with cer-

tainty in such a case whether the tuberculosis of the intestine was of human or animal origin. Now we can make the diagnosis. All that is necessary is to cultivate in pure culture the tubercle bacilli found in the tuberculous material, and ascertain whether they belong to the bovine tuberculosis by inoculating cattle with them. For this purpose I recommend subcutaneous injection, which yields quite specially characteristic and convincing results. For half a year past I have occupied myself with such investigations, but, owing to the rareness of the disease in question, the number of cases I have been able to investigate is small. What has hitherto resulted from this investigation does not support the assumption that bovine tuberculosis occurs in man.

"Though the important question whether man is susceptible to bovine tuberculosis at all is not yet absolutely decided, and will not admit of absolute decision to-day or to-morrow, one is nevertheless already at liberty to say that if such a susceptibility really exists, the infection of human beings is a very rare occurrence. I should estimate the extent of the infection by the milk and flesh of tuberculous cattle, and the butter made of their milk as hardly greater than that of hereditary transmission, and I therefore do not deem it advisable to take any measures against it."—Agricultural Education.

Field Work in Forestry.

Within the past few years the scope and efficiency of the Division of Forestry (recently reorganized as the Bureau of Forestry of the United States Department of Agriculture), has been greatly increased. For some time the Bureau has offered to send out parties of student assistants under the charge of a field assistant to work upon practical

forestry problems for any individual, corporation, or state that would agree to pay the necessary field expenses of the party.

The State of New York owns extensive tracts of virgin forest in the Adirondack region known as the Adirondack Park Reserve, as well as smaller tracts in the Catskills, and so has taken advantage of this offer of the Forestry Bureau.

The constitution of New York State at present prohibits any cutting whatsoever on state land. Since timber is constantly maturing and falling, this system is just as much opposed to the modern principles of forest management as indiscriminate felling.

The Forest, Fish and Game Commission of New York has taken the matter in hand, and are endeavoring to stir up public sentiment to such an extent that this article of the constitution may be amended by a popular vote. With this object in view the commission engaged the services of a party of student assistants under Field Assistant R. S. Hosmer and Assistant Forester, Jean Bruce, during the summer of 1900.

As the Raquette Lake region offered the largest unbroken tract of virgin forest, the task was given them of securing data and preparing a working plan for conservation of the Totten and Crossfield Purchase, Hamilton county. Many of you are no doubt familiar with the results of this work as published in Bulletin 30 of the Bureau, which appeared in June of last year.

The Commission was so well satisfied with the results of this work that they asked for a larger party and more extended appropriations for the summer of 1901, with a view of the preparation of similar working plans for the adjoining Townships, Nos. 41, 45 and 46.

Having been a member of this party under Field Assistant R. S. Hosmer be-

tween July 1st and September 1st, I will note a few points regarding the party, its personnel, methods and routine.

Before the arrival of the undergraduates the work on Township 41 had been almost completed by a smaller party of graduate students from a camp on Shallow Lake, and most of the party were in camp on the carry at the head of eighth lake of the Fulton chain of lakes in township number 5. The party was made up of about eighteen student assistants, both graduate and undergraduate, from almost as many institutions, Yale, Harvard, Princeton, Columbia, Williams, Amherst, Trinity, Lafayette, Cornell, Illinois, Iowa, Michigan and Ohio State, being represented.

The commissary department was managed by our French Canadian chef, an assistant cook and a Canadian "tote man."

The various field parties were in charge of expert practical lumbermen and scalers, of which there were three in the party.

For the preparation of a working plan for lumbering according to forestry principles, data of various kinds are necessary, such as approximate estimates of the stand of timber of the different varieties under different condition of cover, notes on the soil and ground cover, and estimates on the rate and manner of reproduction.

In order to do this work efficiently the party was divided up into small crews, each placed under the charge of a man of more or less experience.

The valuation crews, of which there were three in number, of course did the most extensive work and were each directed by one of the practical lumbermen. This crew was made up of two or three caliper men and a tally-man, in addition to the woodsman. The work of this crew consisted in taking and re-

cording the diameters of all the timber, down to five inches in soft woods, and ten inches in hard woods, on certain measured strips of land surveyed at regular intervals through the forest. These strips are a chain in width and usually a quarter of a mile apart. The course of the tally-man, who drags the chain at his belt, is directed by the woodsman and the caliper men work 33 feet each side of the chain reporting the number and diameters of the trees of different varieties at the end of each chain. Working in this way a good crew will cover from fifteen to thirty-five acres per day, according to the nature of the topography.

In the valuation survey the work of the height crew, composed of two men, is closely related with that of the caliper crew.

By means of a convenient little instrument called the hepsometer, the height and diameter of a large number of average typical specimen trees of each variety, is taken, under various conditions of growth. The average of all the height in each diameter class is used as a standard by which to compute the number of feet of lumber in the timber calipered. Hence we obtain a close approximation of the value of a given stand of timber.

Another important work consists in the estimation of the rate of growth of forest trees under different conditions. This is accomplished by counting the annual rings at regular intervals from the neck or top of the root swelling to the top of the tree. The diameters of both wood and bark are taken at each cut. Upon the results of this work depends the determination of the date at which the harvesting of a record crop of timber may begin, as well as the minimum diameters to which cutting will be allowed.

Work upon the extent, character, and condition of the reproduction of each variety of tree is assigned to another crew, and still another one records all

the varieties of vegetation to be found upon typical quarter acres in the forest.

The valuation survey of the three townships was completed shortly before September 1. A small part of the party under Assistant Forester Bruce is now engaged in the topographical work necessary to map out the lumber roads, storages, etc., as well as possible sites for mills and lumber camps.

The maps are all reproduced from the U. S. Geological maps of the region with such additions as are necessary.

The timber of this region is largely of the soft wood or coniferous type, the variety in the most abundance being spruce. Much hemlock, larch, balsam, and cedar is also found, with an occasional cluster of pines. Among the hard woods we find birch, beech, and maple to be the most predominant varieties, with a few cherry, ash and poplar.

The elevation of this country varies from 1700 feet (at the lake level) to 3000 feet above the sea. Hence it will be seen that much of the timber lands will be difficult of access. And a great deal, especially of the hard woods, will probably never be lumbered, on account of the difficulty of transporting it to the mills. While on the other hand the light coniferous timbers can easily be floated down the streams and lakes.

For many years the Adirondacks have furnished a most noted summer resort and camping ground for immense numbers of people from our eastern cities. The cool climate resulting from the high altitude, the beautiful mountain lakes and streams, well stocked with fish, offer rare sport to the angler, as well as to the oarsman, and during the open game season it is estimated that five thousand deer are annually shipped out of the Park without any apparent diminution of the supply.

It is the aim of the State Commission to preserve the natural beauties of this

park and keep it for a public pleasure ground, and at the same time by careful supervision and conservative lumbering, to derive a steady revenue for the state.

Similar work has been done in a number of states and it is evident that the public is waking up to the fact that existing forests must be preserved and new ones planted.

Mr. A. Knechtel, '01, of the New York State Forestry School, and student assistant in the Bureau during the past summer, was recently tendered a position as Forester of New York, with a salary of one thousand dollars and expenses the first year, which he accepted, with every prospect of advancement.

This is only one example showing that the study of forestry offers a good opening to scientific students.

H. A. CLARK.

The Asparagus Rust.

BY V. H. DAVIS.

One of the most serious menaces to successful asparagus culture at the present time is the asparagus rust. While the disease has been known to exist in various parts of this country for many years the first serious outbreak outside of California was during the summer of 1896. That summer the disease appeared almost simultaneously in various parts of the country and did so much damage as to cause alarm. The Experiment Stations in several states took up a study of the disease, but even yet no satisfactory destructive or even controlling measures have been discovered.

The rust is caused by a fungus described over one hundred years ago by DeCandolle as *Puccinia asparagi*. It is one of the uredineæ, having the three forms of spores produced on the same host. One need not look, therefore, any further than the asparagus for a plant to

complete the chain of its life history, as is the case with the rust of the wheat, one form of which has been supposed to multiply only on the barberry. The rust is itself a very small plant, which sends its microscopic roots into the tissues of the host, robbing it of its vitality by absorbing the plant-food and breaking down the cellular structure. Later they rupture the epidermis and numberless spores, corresponding to the seeds of the higher plants, are produced. The brownish color is due to these multitudes of spores pushing their way through the plant tissues to the light. The æcidial form usually appears in the spring or early summer and are rarely ever seen, as they are light-colored and watery. The uredo and teleuto spores seem to be formed almost simultaneously as they may be found side by side in the same sorus. The uredo spores are thin-walled, almost spherical, one-celled, and impart a light brown or rusty color. They are also known as summer spores. The teleutospores are thick-walled, oblong in shape, usually two-celled, and almost black in color. These are known as the winter spores. They live on the refuse of the plant and in the soil, and serve to propagate the disease the next spring, producing the æcidial form, thus completing the life cycle of the fungi.

The presence of the rust may be recognized by an unusually early maturing of the plants. The dark-green color is replaced by a brownish or yellowish hue, as if insects or drouth had destroyed their vitality.

While the rust has been present in the beds of the University gardens for some time the first serious appearance was last year upon seedling plants. The old bed was not generally effected, although the rust was present in spots. This year the one-year-old plants began to show the effects of the disease about the middle of August, turning the characteristic

brownish yellow, as if effected by the severe drouth. An examination of the plants, however, revealed the real cause of the trouble, although the drouth doubtless hastened these visible signs of lost vitality. About the first week in September the old bed began to show signs of general attack and at the present time every plant in the bed is effected and turning yellow.

The first remedy that suggested itself was spraying with some fungicide, but experiments along this line have not showed as great gains as was hoped for. Neither is there any chance for a rotation of crops, as asparagus is a perennial. The treatment of the infested fields in autumn by destroying all diseased plants is probably the most effective method of control yet found. As soon as the plants become brown and practically lifeless, and after all chance of a new growth is passed, cut and burn the bush. The cutting should be done close to the ground and the plants allowed to dry as they fall. Any attempt to rake them into piles breaks off many stems and serves to scatter the disease. If the tops, when cut and dried, are not thick enough for the fire to run over the entire bed, cover the bed with straw before firing. No injury to the roots may be expected, because they are deep in the soil and the fire is on the soil only for a very few minutes. This should destroy the greater number of winter spores, and consequently reduce the degree of infection the following year.

At present there seems to be a possibility that relief will come through nature's wonderful provisions for maintaining an equilibring in her realm. Two fungi have been found growing upon the spores of the asparagus rust, *Darluca filum* and *Tubercularia persicina*. To the naked eye the first fungi gives the rusted plant a mouldy appearance. Microscopic study has not gone far enough

to warrant an opinion as to the amount of influence this fungi has in checking the growth and spread of the rust, but it has come to be looked upon as a friend by asparagus growers. This raises a further question as to spraying. The grower is in a dilemma. The rust comes before the Darluca, but if the spraying only slightly retards the rust and effectually kills the Darluca, which might later attack the rust, it is possible that spraying to check the rust might defeat its own end.

The second fungus has been found mostly on asparagus plants growing wild and attacks the cluster cups of the æcideal form in the early spring. Spraying in the field, therefore, may not interfere with the work of this fungus. It is yet to be determined, however, how much these fungi may be depended upon to hold the disease in check.

So far as observation has gone the character of the soil has no direct influence upon the rust, the disease attacking plants growing upon all kinds of soil in every state of fertility. It has been found, however, that the "Palmeto" variety is more resistant to attack than any other. We take the following from the American Gardening, of September 28, which is the latest account of an experiment with spraying which has come to our notice:

"A test of spraying for the arrest of asparagus rust at the Geneva, N. Y., Station gave a gain of almost half in quantity and quality. The first trial was to find out the value of a combined resin-bordeaux mixture, this being a one-eighth bordeaux mixture with two gallons of the stock resin solution added to each fifty gallons. Three applications were made, namely, August 5, 17 and September 1. Great care was taken to have every part of the asparagus coated with the fungicide without wetting the plants, so as to cause drip.

"The unsprayed portion of the field was stripped of foliage and dead by October 7, while the sprayed plants held their foliage until frost. The next spring a careful record was kept of the yield of the sprayed and unsprayed plots. For comparison, the middle row of each of the sprayed and unsprayed portions were taken. The results were:

	Yield, Pounds.	—Bunches— Primes. Culls.		—Value— Primes. Culls.	
Sprayed	438	118	27	16.61	1.64
Unsprayed. . .	258	53	33	7.42	1.98
Difference ..	179	65	6	9.19	.34

"The tests were repeated the following season upon a larger area and with increased precautions. The yielding capacity of the field before treatment was found by a careful grading and weighing of the cuttings the season previous. After the last cutting was made the brush was allowed to grow for four weeks, after which five sprayings were given, the first on July 28. Alternate rows were sprayed and left as checks. The rust showed on the unsprayed rows August 19, and by August 24 had spread to all parts of these rows, and they were killed September 10. The sprayed rows remained green until the middle of October, but it was only the growth made between July 1 and August 10 that survived the attack of the rust until October 15; that is, a growth that was completed, hardened and thoroughly sprayed before the rust struck the bed. All the new sprouts that came up in the sprayed rows after the rust appeared in the field were destroyed.

"Cutting began May 14 and lasted until July 2. Comparisons were made, not only between sprayed and unsprayed rows, but between the yield of the current season on treated and untreated rows and the yields of the previous season before treatment began, this last being to find out if the rust lessened the vitality of the plants.

"The result showed that in the case of unsprayed rows the yield was less than in 1899, the decrease on the seven rows being 179 pounds. Out of the sprayed rows, on the contrary, there was a constant gain of from 11 to 22 pounds to the row, the total increase being 110 pounds. The comparison in detail:

	Yield. Pounds.	—Bunches— Primes. Culls.		—Value— Primes. Culls.	
Sprayed ..	875	192	83.4	27	5.
Unsprayed. . .	595	121	84.1	17	5.04
Difference ..	283	71	.7	10	.04

"The increased money value paid for the additional cost of spraying, but the loss of vitality from the attack of the rust must also be taken into the account. Had the entire field been sprayed the result would probably have been better than it was in single rows. But even with this disadvantage the increased yield of 48 per cent. in weight and 44.5 per cent. in value represents the gain from spraying."

Book Review.

Agricultural Bacteriology, by H. W. Conn, Professor of Biology, Wesleyan University. 412 pages with numerous text illustrations. P. Blakiston's Son & Co., Philadelphia. Price \$2.50.

So far as we know this is the first book dealing with bacteria from a purely agricultural standpoint and treating the subject from several points of view. Only within the last few years has the relation of bacterial life to agriculture in its varied phases, come to be at all understood, and at present no subject offers a better field for investigation and study. The book is intended primarily for the student and contains much valuable information, but to the practical farmer without some technical education, it will not especially appeal.

The book is divided into five parts. Part I. treats of the General Nature of Bacteria and Fermentation; II, of Bacteria in Soil and Water; III, of Bac-

teria in Dairy Products; IV, The Relation of Bacteria to Miscellaneous Farm Products; V, Parasitic Bacteriology. There is also a chapter on disinfection, which is a valuable addition to the book.

"The stockman whose training has been solely in the school of experience often holds in light regard that which is written concerning his vocation. Let him remember that facts and truths are the same whether their repository is a book or the human mind. Held by the latter, all perish with the possessor; in the keeping of the former, the whole world may be benefited."—Prof. W. A. Henry.

"Go to the country where man lives close to nature's heart, study him as he there meets the problems of life and you will find literature which is realistic in the best and truest sense. Men of the country are to our national life what the steel frame work is to the mighty stone or brick structure, when the crises come which shake the nation to its foundation. It is the loyal hearts, the clear brains of the country folk which save it from destruction."—(Ian McLaren) Rev. John Watson.

"It has been said that 'anybody can farm.' That was, but is not, true. From this time on the struggle in farming will be such as it has been in mercantile affairs for some time. The unfitted in agriculture will have to yield for the same reason that many little factories, located off the lines of transportation, furnished with inadequate power, machinery, and brains, have been abandoned. The farmer is wise who adjusts himself quickly to present conditions, so unlike those of his father. To do this, he must see clearly and think straight."—Prof. I. P. Roberts.

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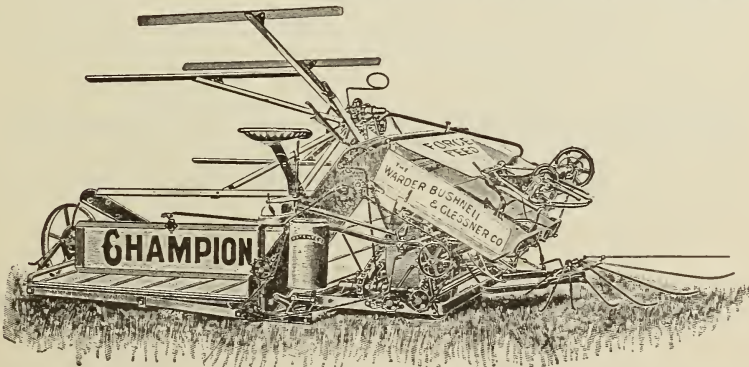
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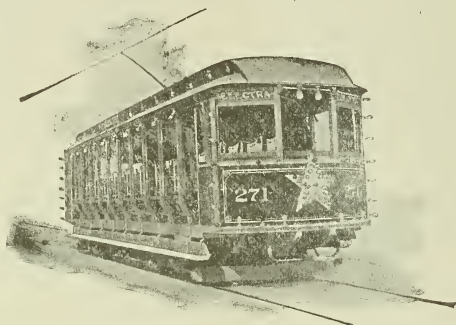
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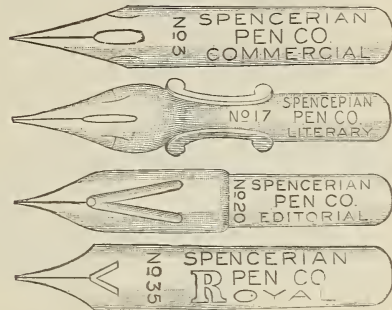
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THE WORLDS WORK FOR OCTOBER.

The leading editorials for October, of course deal with the assassination of President McKinley and are illustrated with striking portraits of the dead President, President Roosevelt, Secretary Hay and Secretary Root. The Pan American policies which Mr. McKinley outlined in his last speech are given full treatment by Frederic Emory, in an article entitled "The Greater America." Other particularly timely articles in the magazine are "The Character of the Police," by Franklin Matthews, in which a more careful selection of the chief of police is demanded, a description of McKeesport in striketime by M. G. Cunniiff, and a characterization of Judge Jerome, of New York, and the aggressive work he is doing to expose police blackmail, by Arthur Goodrich. Frank Norris tells what he thinks is The True Reward of a Novelist. Sydney Brooks writes of Russia, in the fifth of his series of descriptions of European countries at the beginning of the century. There are a number of handsomely illustrated articles, one by R. E. Phillips, comparing the treatment of wayward children in institutions and at the George Junior Republic, another by W. Frank McClure, about improved conditions in the country districts; a description by C. Lockhart, of the opening up of Ecuador by Americans, how a Sahara has veritably bloomed in the West through irrigation, by William E. Smythe, and an article showing that a good road is a good investment, by Earl Mart. The results of a careful investigation of Child Labor in Southern Cotton Mills are given by Irene M. Ashby, and John B. Lander tells of the personality and manifold work of James Stillman, Banker.

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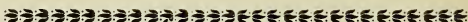
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